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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/051,739

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Matthew M. Borg

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09/30/2005

AGILENT TECHNOLOGIES, INC.

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Intellectual Property Administration

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EXAMINER

QUIETT, CARRAMAH J

ART UNIT

PAPER NUMBER

2612

DATE MAILED: 09/30/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/051,739

Applicant(s)

BORG, MATTHEW M.

Examiner

Carramah J. Quiett

Art Unit

2612

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 09 May 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-6 and 15-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3,5,6 and 14-20 is/are rejected.
- 7) ☒ Claim(s) 2,4 and 21 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

1. The amendment(s), filed on 05/09/2005, have been entered and made of record. Claims 1-6 and 14-21 are pending. The Applicant has canceled claims 7-13 and added claim 21.

### ***Response to Arguments***

The Examiner respectfully disagrees. In col. 4, lines 7-19, Fowler states that alternately, the pixel device can be reset using a signal other than a voltage level. In col. 3, lines 22-32, incorporates a reference that teaches additional pixels. Please see the cited prior art below.

Additionally, the Applicant did not claim "row-wise noise" and "operational amplifier" in claim

1. The Applicant also did not claim "operational amplifier" in claim 6.
2. Applicant's arguments with respect to claims 1-6 and 15-21 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1 and 2 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim

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does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 1 recites the broad recitation "a reset line", and claim 1 also recites "one of the reset lines." which is the narrower statement of the range/limitation. Claim 2, which is dependent on claim 1, also recites "one of the reset lines." For the purpose of a prior art rejection, claims 1 and 2 will be interpreted as best understood by the Examiner.

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 1, 3, 5-6, and 14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fowler (U.S. Pat. #6,424,375) in Merrill et al. (U.S. Pat. #6,833,871).

For **claim 1**, Fowler discloses an image capture system (fig. 1) comprising,

- a plurality of rows of pixels (col. 3, lines 22-32)\*, each row comprising:
  - a reset line for providing a reset signal (col. 3, lines 22-32; col. 3, lines 55-58; col. 4, lines 20-22 and 31-67)\*;
  - a plurality of pixels (col. 3, lines 22-32)\*, each pixel (100) comprising:
  - a first FET (108) having a gate terminal (109) coupled to the reset line (col. 3, lines 55-58; col. 4, lines 20-22 and 31-67), a drain terminal (113) coupled to a supply voltage ( $V_{dd}$ ; col. 4, lines 25-27), and a source terminal (111) coupled to a readout node ( $V_{pd}$ ; 110; col. 3, lines 39-42 and col. 4, lines 21-29) ; and
  - a photodetector coupled (112) between a first ground and the readout node ( $V_{pd}$ ; 110; col. 3, lines 39-42 and col. 4, lines 21-29);
- a switching device (122) selectively coupled to one of the reset lines in the rows of pixels (col. 3, lines 22-32; col. 4, lines 30-34); and
- a reference voltage source ( $V_{pr}$ ) coupled between a second ground and one of the reset lines via the switching device (col. 4, lines 7-19), wherein the reference voltage source generates a reset voltage ( $V_g$ ; col. 4, lines 15-19) (col. 4, lines 7-19) and the first and second grounds have the same potential (col. 7, line 61-66).

However, Fowler does not expressly teach that the reference voltage source generates a reset voltage that is independent of the supply voltage. In the same field of endeavor, Merrill teaches that the reference voltage source generates a reset voltage that is independent of the supply voltage (fig. 7, ref. 170; col. 11, lines 55-61). In light of the teaching of Merrill, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the sensor of Fowler with a reference voltage source which generates a reset voltage that

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is independent of the supply voltage in order to reduce noise thereby enhancing the dynamic range of the image (Merrill, col. 2, lines 14-24).

**\*Note:** Fowler incorporates a reference that teaches the plurality of row of pixels and a reset line as claimed above. Please see the cited prior art below.

For **claim 3**, Fowler, as modified by Merrill, further discloses an image capture system wherein the first FET further comprises an n-channel enhancement mode MOSFET (col. 3, line 60).

For **claim 5**, Fowler, as modified by Merrill, further discloses an image capture system comprising a second FET (114) having a gate terminal coupled to the readout node ( $V_{pd}$ ; 110) and a drain terminal coupled to the supply voltage. As shown in circuits 102 and 104 of fig. 1, the drain terminal of second FET (114) is connected to the supply voltage,  $V_{dd}$ , and the gate terminal is connected to the first FET (108) via a node (110). Also read col. 3, lines 39-43.

For **claim 6**, Fowler, as modified by Merrill, further discloses an image capture system comprising a third FET (116) having a gate terminal coupled to a row select line, a source terminal coupled to a column line, and a drain terminal coupled to a source terminal of the second FET. See figure 1 and read col. 3, lines 39-43. The pixel of Fowler is a typical CMOS Active Pixel Sensor (APS) (col. 3, lines 21-54). Therefore, it is inherent for the transistor (116) to have a row select line at the gate terminal and a column line at the source terminal.

For **claim 14**, Fowler, as modified by Merrill, discloses the image capture system wherein the switching device (fig. 1; refs. 106 and 122) comprises a multiplexer. The compare module (106) and the switch (122) receive signals from  $V_r$ ,  $V_{pr}$ , or  $V_g$ , and the output of  $V_2$  to

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reset transistor (108). Therefore, the compare module (106) and the switch (122) inherently multiplex signals from  $V_r$ ,  $V_{pr}$ , and  $V_g$ .

8. **Claims 15-20** are rejected under 35 U.S.C. 103(a) as being unpatentable over Dhuse et al. (U.S. Pat. #6,133,862) in view of Merrill et al. (U.S. Pat. #6,833,871).

For **claim 15**, Dhuse discloses a method comprising:

- providing a first reset ( $V_{reset1}$ ) signal to a row of pixels (col. 6, line 65 – col. 7, line 9), the first reset signal being derived from a reference voltage (col. 7, lines 46-51);
- resetting pixels in the row of pixels (col. 6, line 65 – col. 7, line 9) in response to the first reset signal ( $V_{reset1}$ ) using a supply voltage, the supply voltage being different from the reference voltage;

In col. 7, lines 45-51, Dhuse teaches that the sensor array is reset to a value of  $V_{reset}$ , which is approximately the supply voltage ( $V_{reset}$  approximately  $V_{cc}-V_{TM1}$ ; col. 5, line 19 – 24);

- reading a first plurality of voltage values generated at the pixels following a light exposure interval (col. 5, line 57 – col. 6, line 1; col. 6, line 65 – col. 7, line 9);
- providing a second reset signal ( $V_{reset2}$ ) to the row of pixels (col. 6, line 65 – col. 7, line 9), the second reset signal being derived from the reference voltage (col. 7, lines 54-56);
- reading a second voltage value from the pixel (col. 7, lines 56-59); and
- generating a plurality of pixel values using the first and the second pluralities of voltage values (col. 6, line 65 – col. 7, line 9; col. 7, lines 51-54 and 59-67).

However, Dhuse does not teach a reference voltage that is independent of a supply voltage. In the same field of endeavor, Merrill teaches a reference voltage that is independent of a supply voltage (fig. 7, ref. 170; col. 11, lines 55-61). In light of the teaching of Merrill, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the sensor of Fowler with a reference voltage that is independent of a supply voltage, in order to reduce noise thereby enhancing the dynamic range of the image (Merrill, col. 2, lines 14-24).

For **claim 16**, Dhuse, as modified by Merrill, further discloses a method wherein the plurality of pixel values equal the corresponding second plurality of voltage values minus the corresponding first plurality of voltage values (col. 7, lines 59-66).

For **claim 17**, Dhuse, as modified by Merrill, further discloses a method wherein the first plurality of voltage values are approximately proportional to light intensities detected by the pixels during the light exposure interval (col. 5, line 57 – col. 6, line 9).

For **claim 18**, Dhuse, as modified by Merrill, further discloses a method comprising repeating the providing a first reset signal, reading a first plurality of voltage values, providing a second reset signal, reading, and generating a plurality of pixel values for another row of pixels (col. 7, lines 45-67).

For **claim 19**, Dhuse, as modified by Merrill, further discloses a method wherein the generating is performed by a column circuit (col. 7, lines 10-35).

For **claim 20**, Dhuse, as modified by Merrill, further discloses a method wherein the reading a first plurality of voltage values comprises exposing photodiodes to incident light (col. 4, lines 7-22).



***Allowable Subject Matter***

9. **Claims 2, 4, and 21** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:

**Claim 2** is allowed because the prior art does not teach or fairly suggest the image capture system of claim 1, comprising an operational amplifier buffer comprising (1) an output coupled by the switching device to one of the reset lines (2) *a non-inverting input coupled to the reference voltage source to receive the reset voltage, and (3) an inverting input coupled to the output in a feedback loop, wherein the feedback loop does not pass through the readout node.*

**Claim 4** is allowed because the prior art does not teach or fairly suggest the image capture system of claim 1, *wherein the reset voltage is greater than the supply voltage.*

**Claim 21** is allowed because the prior art does not teach or fairly suggest the image capture system of claim 6, further comprising an operational amplifier comprising (1) an output coupled by the switching device to one of the reset lines, (2) *a non-inverting input coupled to the reference voltage source to receive the reset voltage, and (3) an inverting input coupled to the output in a feedback loop, wherein the feedback loop does not pass through the readout node.*

***Conclusion***

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Tartagni, Marco et al., A Fingerprint Sensor Based on the Feedback Capacitive Sensing Scheme, January 1998, IEEE Journal of Solid-State Circuits, vol. 33, no. 1, pages 139-140, figs. 13-14.

Merrill et al. (U.S. Pat. #6,476,372)

Active pixel sensor incorporated by reference in Fowler (U.S. Pat. #6,424,375).

The reset voltage can be made equal or greater than the voltage at the reference supply.

Phan (U.S. Pat. 6,861,635)

A high voltage reset circuit with blooming control that increases the dynamic range of a CMOS image sensor.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carramah J. Quiett whose telephone number is (571) 272-7316. The examiner can normally be reached on 8:00-5:00 M-F.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thai Q. Tran can be reached on (571)272-7382. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

CJQ  
September 19, 2005

  
THAI Q. TRAN  
PRIMARY EXAMINER